

Lab 5 - STP Election

Lab 5: STP election

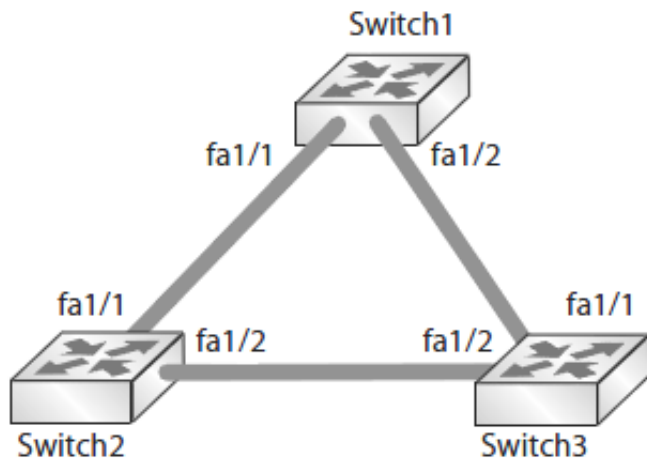


Figure 13-5: STP election

VLAN 2 and 3 exist on all switches.

Lab exercise

Your task is to configure the above network so that Switch2 is always the Root Bridge for VLAN 2 and Switch3 is the Root Bridge for VLAN 3. You will need to connect the three switches together with crossover cables.

Purpose

STP is a very important topic for the CCNA exam and you can expect to be tested on both your theoretical knowledge and hands on ability. For this lab you will configure the switches to ensure that the correct switch is the Root Bridge. In the real world, if the incorrect Switch becomes the Root Bridge, the network will experience delays.

Lab objectives

1. Configure Ports fa0/1 and fa0/2 on all switches as 802.1q trunks (default on 2950 switches).
2. Create VLAN 2 and VLAN 3 on all the switches.
3. Configure Bridge Priority on Switch2 and Switch3 for VLAN 2 and VLAN 3, respectively.

Lab walk-through

1. Let's first check the status of the switches. The VTP domain name should match. We will also want to check if any interfaces are already trunking. We will check the outputs on Switch1. You can do the same on Switch2 and Switch3.

```
Switch1#sh vtp status
```

```
VTP Version          : 2
```

Configuration Revision : 1
Maximum VLANs supported locally : 250
Number of existing VLANs : 10
VTP Operating Mode : Server
VTP Domain Name : howtonetwork
VTP Pruning Mode : Disabled
VTP V2 Mode : Enabled
VTP Traps Generation : Disabled
MD5 digest : 0xB7 0xE3 0x3A 0x57 0x1D 0x41 0x42 0x40
Configuration last modified by 0.0.0.0 at 3-1-93 01:11:38
Local updater ID is 0.0.0.0 (no valid interface found)

Switch1#show interface trunk

Port	Mode	Encapsulation	Status	Native vlan
Fa0/1	desirable	802.1q	trunking	1

Port	Vlans allowed on trunk
Fa0/1	1-4094

Port	Vlans allowed and active in management domain
Fa0/1	1-2,13,100,111,250

Port	Vlans in spanning tree forwarding state and not pruned
Fa0/1	2,13,100,111,250

Switch1#

You can see that the VTP domain name is “howtonetwork” and that the only trunking interface on the switch is fast 0/1. Please set all the switches to the same VTP domain name with either the legacy commands or the modern commands. Please also make sure all switches are set to VTP server (this should be the default but another user may have changed this).

Legacy:

Switch#vlan database

```
Switch(vlan)#vtp domain howtonetwork
```

Modern:

```
Switch(config)#vtp domain howtonetwork
```

And server commands:

```
Switch2(config)#vtp mode ?
```

client Set the device to client mode.

server Set the device to server mode.

transparent Set the device to transparent mode.

2. To configure the switches for trunking on relevant ports, follow the below commands.

You will not be able to enter the encapsulation command on a 2950 because it is dot1q, by default:

```
Switch#configure terminal
```

```
Switch1(config)#hostname Switch1
```

```
Switch1(config)#interface range fa0/1 - 2
```

```
Switch1(config-if-range)#switchport trunk encapsulation dot1q
```

```
Switch1(config-if-range)#switchport mode trunk
```

```
Switch#configure terminal
```

```
Switch1(config)#hostname Switch2
```

```
Switch2(config)#interface range fa0/1 - 2
```

```
Switch2(config-if-range)#switchport trunk encapsulation dot1q
```

```
Switch2(config-if-range)#switchport mode trunk
```

```
Switch#configure terminal
```

```
Switch1(config)#hostname Switch3
```

```
Switch3(config)#interface range fa0/1 - 2
```

```
Switch3(config-if-range)#switchport trunk encapsulation dot1q
```

```
Switch3(config-if-range)#switchport mode trunk
```

Please note--your ports on a 2950 may be numbered 1/1, 1/2, and so on. You can miss off the encapsulation command on the 2950. The range command may not work on

your switch if it has an older IOS release so you will have to set the configs per interface.

You can now check which interfaces are set to trunking:

```
Switch1#sh int trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Fa0/1	on	802.1q	trunking	1
Fa0/2	on	802.1q	trunking	1

3. To create VLANs on all switches:

```
Switch1(config)#vlan 2,3
```

```
Switch2(config)#vlan 2,3
```

```
Switch3(config)#vlan 2,3
```

You should then be able to see that VLANs 2 and 3 are part of the spanning tree:

```
Switch1#show interface trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Fa0/1	on	802.1q	trunking	1
Fa0/2	on	802.1q	trunking	1

```
Port Vlan allowed on trunk
```

```
Fa0/1 1-4094
```

```
Fa0/2 1-4094
```

```
Port Vlan allowed and active in management domain
```

```
Fa0/1 1-3,13,100,111,250
```

```
Fa0/2 1-3,13,100,111,250
```

```
Port Vlan in spanning tree forwarding state and not pruned
```

```
Fa0/1 1-3,13,100,111,250
```

```
Fa0/2 1-3,13,100,111,250
```

```
Switch1#
```

4. Check the switches to see which is the Root Bridge for VLANs 2 and 3. Some of the output is omitted and, of course, your output will be different due to MAC address numbers.

```
Switch2#show spanning-tree vlan 2
```

```
VLAN0002
```

```
Spanning tree enabled protocol ieee
```

```
Root ID  Priority  32768
```

```
Address  0009.7c87.9081
```

```
Cost      19
```

```
Port      1 (FastEthernet0/1)
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority  32770 (priority 32768 sys-id-ext 2)
```

```
Address  0008.21a9.4f80
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Aging Time 300
```

Interface	Port ID		Designated		Port ID
Name	Prio.Nbr	Cost	Sts Cost	Bridge ID	Prio.Nbr

Fa0/1	128.1	19	FWD 0	32768 0009.7c87.9081	128.13
Fa0/2	128.2	19	FWD 19	32770 0008.21a9.4f80	128.2

And now issue the same command on Switch3. The output is slightly different due to different versions of code:

```
Switch3#show spanning-tree vlan 2
```

```
VLAN0002
```

```
Spanning tree enabled protocol ieee
```

```
Root ID  Priority  32768
```

```
Address  0009.7c87.9081
```

```
Cost      19
```

```
Port      1 (FastEthernet0/1)
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

Bridge ID Priority 32770 (priority 32768 sys-id-ext 2)

Address 000f.23a6.8940

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Aging Time 300

Interface	Role	Sts	Cost	Prio.	Nbr	Type

Fa0/1	Root	FWD	19	128.1		P2p
Fa0/2	Altn	BLK	19	128.2		P2p

The spanning tree cost for a 100Mbps interface is 19, and you can see that output in the Cost field.

You can issue a show interface fast 1/1 on Switch1 to verify the MAC address to see that it owns the MAC address allocated as the Root.

```
Swth1#show int fast 1/1
```

```
FastEthernet1/1 is up, line protocol is up
```

```
Hardware is Fast Ethernet, address is 0009.7c87.9081
```

5. Do the same for VLAN 3 to see where the root is.

```
Switch2#show spanning-tree vlan 3
```

```
VLAN0003
```

```
Spanning tree enabled protocol ieee
```

```
Root ID Priority 32768
```

```
Address 0009.7c87.9084
```

```
Cost 19
```

```
Port 1 (FastEthernet0/1)
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

The above MAC address belongs to Switch1 again.

6. Configure bridge priority on Switch2 and Switch3 for VLAN 2 and VLAN 3, respectively.

We want Switch2 to be the root for VLAN2 and Switch3 to be the root for

VLAN3. Here, we can use the trusty question mark to give us more information:

Switch2(config)#spanning-tree vlan 2 ?

forward-time Set the forward delay for the spanning tree
hello-time Set the hello interval for the spanning tree
max-age Set the max age interval for the spanning tree
priority Set the bridge priority for the spanning tree
root Configure switch as root
<cr>

Switch2(config)#spanning-tree vlan 2 priority 4096

Switch3(config)#spanning-tree vlan 3 priority 4096

Now, we can issue the “show spanning-tree vlan #” command to check that the respective switches are the roots for the desired VLANs.

Switch2#show spanning-tree vlan 2

VLAN0002

Spanning tree enabled protocol ieee

Root ID Priority 4098

Address 0008.21a9.4f80

This bridge is the root

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 4098 (priority 4096 sys-id-ext 2)

Address 0008.21a9.4f80

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Aging Time 300

Interface	Port ID		Designated		Port ID
Name	Prio.Nbr	Cost	Sts Cost	Bridge ID	Prio.Nbr

Fa0/1	128.1	19	FWD 0	4098 0008.21a9.4f80	128.1
Fa0/2	128.2	19	FWD 19	4098 0008.21a9.4f80	128.2

And if we do the same for VLAN3 on Switch3, we see that it is the root for that VLAN:

Switch3#show spanning-tree vlan 3

VLAN0003

Spanning tree enabled protocol ieee

Root ID Priority 4099

Address 000f.23a6.8940

This bridge is the root

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 4099 (priority 4096 sys-id-ext 3)

Address 000f.23a6.8940

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Aging Time 300

Interface	Role	Sts	Cost	Prio.	Nbr	Type

Fa0/1	Desg	FWD	19	128.1		P2p
Fa0/2	Desg	FWD	19	128.2		P2p

Running Configuration

Switch1#sh run

Building configuration...

--output truncated--

hostname Switch1

!

interface FastEthernet0/0

!

interface FastEthernet0/1

switchport mode trunk

!

interface FastEthernet0/2

switchport mode trunk

!

Switch2#sh run

Building configuration...

--output truncated--

hostname Switch2

!

spanning-tree vlan 2 priority 4096

!


```
!  
!  
!  
!  
interface FastEthernet0/0  
!  
interface FastEthernet0/1  
    switchport mode trunk  
!  
interface FastEthernet0/2  
    switchport mode trunk  
!  
Switch3#sh run  
Building configuration...  
--output truncated--  
hostname Switch3  
!  
spanning-tree vlan 3 priority 4096  
!  
!  
!  
!  
!  
interface FastEthernet0/0  
!  
interface FastEthernet0/1  
    switchport mode trunk  
!  
interface FastEthernet0/2  
    switchport mode trunk  
!
```



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